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NATIONAL WEATHER SERVICE

**SPECIFICATION FOR
NOAA WEATHER RADIO (NWR) TRANSMITTERS**

**Section C.3
System Specification**

DRAFT

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C.3 DESCRIPTION/SPECIFICATIONS

C.3.1 Scope and Background

The existing NOAA Weather Radio (NWR) service is provided by means of a network of more than 450 VHF radio transmitters licensed, operated, and maintained either directly or under the auspices of the National Weather Service (NWS). The radio equipments (i.e., transmitters, antennas, and programming consoles) are primarily Government-owned, although there are some cases where non-NWS public and private organizations (hereafter known as Cooperators) own and operate the transmitters under Memoranda of Agreement (MOA) with NWS. The system currently delivers a continuous stream of audio programming in the form of weather messages (known as "products") directly to the public from NWS Forecast Offices. These messages can range from an informational climatological Outlook, or a River Recreation Statement, to an action oriented Tornado Warning. Among these products, Warnings pertain to immediate verified threats to the safety and well being of the public. As such they must be provided to the public in as timely and reliable a means as possible. Appended to these Warnings are signals and digital codes that can alert individuals to specific threats in specific areas and that can be used to trigger the FCC's Emergency Alert System (EAS). Users may preselect those events and specific areas that are of particular interest to them by programming special receivers which are designed to identify and be activated by preprogrammed location and event codes broadcast as part of an NWR message. The system utilizes VHF FM broadcast technology in the 162.400 to 162.550-MHz land mobile band. The service is available in all 50 states plus Puerto Rico, the Virgin Islands, and the Mariana islands. Details of the current

system, including a breakdown of Government and Cooperator ownership of equipment, may be found in Appendix C.12.1.

The NWS is presently expanding the current coverage of the NWR, which is currently estimated to be 75 to 80 per cent of the population, to a level of 95% mandated by Vice-President Gore in 1994. This is generally being done through cooperative public/private sector initiatives and partnerships whereby Cooperators provide site facilities, procure and install transmitters, and gift them to the NWS for operation. It is the intent of the NWS to add new transmitters to the NWR network and eventually replace or refurbish existing NWR transmitters with new technology that will cost effectively meet or exceed the high level of performance provided by the current NWR network, while delivering a more meaningful and extensive range of more timely NWS products to a larger number of users. The transmitters selected will be of modular design and will meet the high performance standards as described in this specification in a way which is attractive from both a technology and cost basis and that can be supported within the existing NWS framework for maintenance. It is the primary intent of this solicitation to establish a contract or contracts to purchase transmitters that meet the functional specifications contained herein in an economical manner and that can be cost effectively operated and maintained by the NWS. The selected Vendor(s) and their respective approved equipment models will constitute a recommended list of one or more vendors for Cooperators that plan to purchase transmitters for ultimate gifting to the NWS. This specification will be made available to those Cooperators for procurement purposes. The Contractor shall support, document, manage the configuration, and provide any other administrative service in support of these gifted transmitters to the same extent required for transmitters purchased directly through this contract. The objective of this effort is to select one or two vendors

who can supply transmitter systems that can cost effectively be added to or replace certain of the existing NWR complement of transmitters, while continuing to operate with the existing complement of transmitters and within the current logistical and maintenance structure. The number of vendors selected will be dictated in part by the projected incremental increase in recurring maintenance and logistics costs required to support the additional transmitter types. The Government will initially purchase 20 or more transmitters of various types from the selected vendors for installation at specific locations for field testing and validation that performance conforms to these specifications.

As **options**, the vendors shall provide Logistical Support (**Option 1**), Maintenance (**Option 2**), Transmitter Installation Services (**Option 3**), and Antennas and Transmission Line (**Option 4**). See C.3.3.3 for additional information on contract core service options. The Government reserves the right to exercise Options 1 and/or 2 in support of equipment sold to Cooperators, and later gifted to NWS. Any option shall be available to Cooperators or the Government at any time during the life of the contract.

Other than programming and monitoring provided by the NWR Console Replacement System (CRS), operation of NWR transmitters is remote from and independent of other NWS systems. In so far as remotely controlled unattended operation is concerned, the Offerer must clearly show that the technology which is proposed is appropriate to this application, and that it will fully meet the objectives of this solicitation .

C.3.2 NWR Network Characteristics

The NWR network has the following characteristics:

- (a) There will be approximately 119 Weather Forecast Offices (WFO) that provide programming and control for the NWR network.
- (b) There are currently 450 transmitters in the NWR network with an estimated 350 to 400 additional transmitters needed to provide 95 per cent coverage of the U.S. population. Funding for additional transmitters has not been approved.
- (c) NWR transmitters are unattended and operate 24 hours per day at locations remote from the NWS program office.
- (d) Each independent program generated by a NWS CRS console located in a WFO is broadcast by one or more NWR transmitters.
- (e) Telecommunications links between CRS and NWR transmitters may be commercial dedicated telephone lines, single point-to-point UHF radio or microwave links, or drops on a microwave network.
- (f) Transmitter operation is monitored by an NWS provided Remote Off Air Monitoring System (ROAMS) that senses or otherwise receives information on variations in designated parameters and automatically notifies the programming WFO or others of the anomaly.

C.3.3 Equipment Specifications

C.3.3.1 Applicable Documents

Electronic Industries Association (EIA)

1. TIA/EIA Standard, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards, TIA/EIA-603, February 1993.

Federal Communications Commission (FCC)

2. Part 15 of FCC Docket 20780 for Class B Computing Devices.

National Oceanic and Atmosphere Administration (NOAA)

3. NWR SAME Specification
4. ROAMS Specification
5. NWS WSOM Chapter A-31, Integrated Logistic Support Planning

National Telecommunication and Information Administration (NTIA)

6. Federal Information Processing Standards (FIPS) #6-4: Counties and Equivalent Entities of the United States, Its Possessions, and Associated Areas, August 31, 1991.
7. Manual of Regulations and Procedures for Federal Radio Frequency Management, National Telecommunications and Information Administration, September 1995 with revisions through May 1997.

Other

8. National Electrical Code (NEC) - Latest Revision

ANSI/IEEE

9. IEEE C95.1-1992 Safety Levels With Respect to Human exposure to Radio Frequency Electromagnetic Fields 2KHz to 300 GHz.
10. *ANSI Y32.16-1975, IEEE STD 200-1975, Standard Reference Designations for Electrical and Electronic Parts and Equipment.*

Federal Communications Commission

11. FCC 97-303, 2nd Memorandum, Opinion and Order, and Notice of Proposed Rule Making.
12. FCC Bulletin 65, Edition 97-01

C.3.3.2 Transmitter Specifications

C.3.3.2.1 Performance Considerations.

The requirements of the NWR are somewhat unique. Whereas some telecommunication systems may incur acceptable performance degradation during periods of adverse weather, the NWR must, in fact, be capable of reliable, consistent and error free operation under adverse weather conditions. Since the **primary** function of the network is to disseminate life-protecting weather alerts under all conditions in the area of immediate interest, the provider(s) of the equipment for this service must be acutely aware of those equipment and design considerations which are affected by such a requirement. Examples would be redundancy of equipment, immunity from power variations, soft failure schemes by which performance degrades gracefully with reduction in signal level as opposed to a precipitous degradation, and antennas and outdoor equipment that must operate, not just survive, under high wind and severe

weather conditions.

In complying with the required high operational reliability requirement, the NWS has established a need for a redundant system scenario that allows continued transmission of the NWS products from a site using a secondary transmitter in the event that the primary transmitter fails. The contractor provided system shall accommodate this switching in both an automated and manual mode. Notwithstanding the NWS operational requirements for redundant transmitters, the Contractor provided equipment must independently meet the reliability, maintainability, and availability requirements detailed in this specification.

As an option the Contractor shall be capable of providing all equipment, services, and facilities needed to support the NWS installation/maintenance requirements described in this specification.

C.3.3.2.2 General Transmitter Specifications

The transmitter system shall be a Commercial Off the Shelf (COTS) system to the maximum extent possible. The transmitter system shall be made available in three dual transmitter configurations identified as G100 (50-125 Watts Output), G300 (125-300 Watts Output), and G1000 (300-1250 Watts Output) as detailed in paragraph C.3.3.2.4.1. Additionally, the G1000 model shall be available in both single rack and dual rack configurations to accommodate varying space limitations. Their type designations shall be G1000-1 and G1000-2 respectively. In addition to other sections within this document, the NWR transmitters shall meet the following specifications:

- (a) Frequency Range: 162. 400 to 162.550 MHz.

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- (b) Audio input: 600 Ohm balanced input with automatic peak detecting gain such that a 1000 Hz tone from -20 dBm to +5 dBm will modulate from 10% up to 100% (adjustable) of the maximum deviation for the selected mode of modulation.
- (c) RF Power Output: Model G1000 - Adjustable 300 to 1250 Watts; Model G300 - Adjustable 100 to 375 Watts; Model G100 - Adjustable 50 to 125 Watts. (All power output ratings are into a 50 ohm load.)
- (d) Output Impedance: 50 ohms
- (e) Transmission Mode: Narrowband FM in 25 KHz channels (starting at 162.400 MHz) - Emission designation of 16K0F3E for voice and 14K0F2D and 5K0F2D for digital coding. Alternate mode in 12.5 KHz channels (starting at 162.400 MHz) with 8K0F3E for voice and 7K0F2D and 5K0F2D for digital coding.
- (f) Maximum Deviation: ± 5 KHz (in 25 KHz channel operation.), ± 2.5 KHz (in 12.5 KHz channel operation.)
- (g) Frequency Stability: 0.0005% (in 25 KHz channel operation) and 0.00015% (in 12.5 KHz channel operation) over the required environmental temperature range
- (h) Audio Response: Within +1 and -3 dB of 6 dB/octave pre emphasis from 100 Hz to 5000 Hz (TIA/EIA-603, Section 4.2.6 extended to 100 Hz and 5000 Hz)

- (i) Audio Bandwidth: 100 to 5000 Hz, minimum [See item (h) above]
- (j) Audio Distortion: No greater than 1 %
- (k) FM Hum and Noise: Less than -40 dB as per Section C.3.3.2.3.2.
- (l) AM Hum and Noise: Less than - 34 dB (TIA/EIA-603)
- (m) Spurious and Harmonic Radiation: Less than -74 dB (TIA/EIA-603)
- (n) Output Bandpass: A bandpass filter cavity appropriate to the maximum transmitter power output level with insertion loss not in excess of 0.5 dB and a 10 dB passband of no more than 2 MHz shall be supplied. Cavity to be mounted on side of cabinet in it's primary position. Alternative positions may be recommended due to local site conditions subject to review and approval by the Government.
- (o) VSWR: Up to **3:1** VSWR at nominally rated power output.
- (p) Remote Diagnostics: Through modem channel on voice grade telecommunications line with RS232 DTE (for on-site connection) and RJ11 DCE (to connect to telephone connection on ROAMS) connections (See Section C.3.3.2.3.5)
- (q) Local Visual Status Indicators: Sufficient to accommodate all required adjustments, and in addition, to indicate status of all remotely sensed parameters/conditions

- (r) Primary Power: Model G1000; 240 VAC +/- 10 %, single phase, 60 Hz +/- 5% (Taps for 208, 220, 230, and 240 VAC). Models G100 and G300; 115/220 VAC.
- (s) Power Consumption (Max) at respective RF power output: Model G1000 - 2500 VA at 1000 Watts; Model G300 - 750 VA at 300 Watts; Model G100 - 250 VA at 100 Watts
- (t) Cooling: Forced filtered air with ability to attach duct work to carry exhaust air to outside of the transmitter building.
- (u) Cooling Air Filtration: Serviceable air filter without interruption of transmitter operation.
- (v) Configurations:
The transmitters and all ancillary equipment shall be housed in standard single or dual EIA 19 inch vertical racks with the following overall external dimensions. Model G1000-1: in single rack width 24 inch nominal, depth 34 inch maximum, height 74 inch maximum.
Model G1000-2: in double rack width 48 inch nominal, depth 34 inch maximum, height 50 inch maximum.
Model G300 and G100: in single rack width 24 inch nominal, depth 34 inch maximum, height 50 inch
- (w) Equipment Configuration: Each dual transmitter shall be configured such that maintenance can be safely accomplished on a failed transmitter without affecting the operational transmitter.

- (x) Operating Environment: Continuous operation in an ambient condition from -30 to +50 degrees C (-22 to +122 degrees F), relative humidity from 10 to 95%, and in salt laden air
- (y) Weight: Dual 1000 watt transmitter - 850 pounds maximum. Weight of each configuration to be minimized.
- (z) Modularity: The NWR transmitter shall be modular in design and construction and shall be packaged in a manner to allow redundant elements to be individually serviced without having to take the operating transmitter off the air. The modularity shall minimize the time needed to effect repairs as well as to reduce the individual size and quantity of spare modules and components normally kept on hand and carried by maintenance technicians. The goal should be to achieve 30 minutes MTTR. (Assume that a trained competent technician is on site with all necessary parts.)
- (aa) Reliability: Minimum system MTBF 10500 hours, all models and configurations of system. Each individual transmitter shall have a designed MTBF of 8760 hours.
- (bb) Maintainability: Mean time to restore (parts on hand) no more than 1 hour (assumes alternate transmitter is on-line).

Mean Time To Restore (MTTR) is the average amount of time required for a trained technician to restore the specific model of transmitter to operation after the report of a failure condition that does not allow transmitter operation at full power. Excluded from the calculation are the number of hours required to travel

to the site and delays in repair that are beyond the control of the transmitter supplier assuming that a trained competent technician is on site with all necessary parts.

C.3.3.2.3 Additional Specification Details

C.3.3.2.3.1 Automatic Control

The RF power output of each transmitter of the dual transmitter system shall be continuously adjustable over its full range. It shall be capable of maintaining a set RF power level with a 10 percent drop of input line voltage. In the event of a reduction in average output power of the operating transmitter to a level below a preset threshold the System shall automatically switch to the standby transmitter. If the switch-over is unsuccessful or if the standby transmitter is unable to maintain at least the power level indicated on the original transmitter, then the system shall switch back to the original transmitter. The threshold shall be adjustable between 0.5 and 0.9 of the selected power output level. When neither transmitter can maintain a power level greater than the preset threshold, a fault signal shall be generated which shall modulate the carrier as specified in paragraph C.3.3.2.3.4.3, subparagraph 3. Automatic switch-over shall also occur when an internal over temperature or high internal VSWR condition associated with the on-line transmitter is sensed. If the switch-over is unsuccessful, the on-line transmitter shall automatically reduce the output power until the temperature or VSWR can be maintained within acceptable limits.

1000 Watt transmitters shall also be capable of automatically switching from a full power level to lesser level (typically that of the exciter) upon failure of the final power amplifier.

C.3.3.2.3.2 Modulation.

Each transmitter in the dual transmitter system shall be designed for phase modulation and be capable of a maximum of ± 5 KHz (± 2.5 KHz on 12.5 KHz channel) deviation on normal voice peaks. An instantaneous modulation limiting circuit shall be provided in each transmitter exciter with a modulation control such that the maximum operating deviation can be set and maintained anywhere within the range of 0 to ± 5 KHz. The audio frequency response and audio filter shall meet the requirements of Section 4.2 of Standard TIA/EIA-603 except as otherwise specified in Paragraph C.3.3.2.2(h). Residual FM-HUM and noise-level modulation shall be down at least 40 dB with respect to a modulation of 1000 Hz at 60% of rated deviation when measured in accordance with Section 4.2.8 of Standard TIA/EIA-603. There shall be no interference between one transmitter and the operation of the other in a dual transmitter configuration. The transmitter shall be capable of 100% modulation with no clipping.

C.3.3.2.3.3 Digital Sub-Carrier Modulation Transmission.

The NWS is interested in modulation technology that will provide for the low-cost transmission of inaudible digital information simultaneously with the normal audio voice signal. If technologically and economically feasible, it is desired that the transmitter be capable of supporting such a dual modulation scheme to accommodate two input data rates. The primary purpose of this requirement is to provide a capability for delivering weather information, particularly watches and warnings, to the hearing-impaired community. Data rates of 150 bps or greater consistent with the limits of current technology are of particular interest for this application. A secondary purpose is to provide a possible transmission vehicle for the Emergency Managers Weather Information Network (EMWIN).

Technology that would allow digital data rates of 1200 bps or more in the 25KHz NWR bandwidth is of particular interest for this purpose. The Contractor shall provide an analysis as to whether such capability is technically and economically feasible and the level of modification (if necessary) required to their product.

C.3.3.2.3.4 Electrical Interfaces

C.3.3.2.3.4.1 General

The Contractor shall, at the governments discretion, provide, logistically support (option 1), maintain (option 2), and install (options 3 and 4), all of the equipment, connectors, and cables needed to interface transmitters to power, signal, and monitoring systems supplied by the NWS. All interfaces shall be capable of operating according to the specifications as defined in this document.

C.3.3.2.3.4.2 Power

(a) An interface to the local primary power system that conforms to NEC standards shall be provided by the Contractor.

(b) The interface shall have adequate protection to ensure minimal program interruption resulting from power surges and impulses due to lightning. Surge and lightning protectors shall be the same or equal to those currently in use by the NWS at existing transmitter sites as follows:

Signal: MCG # DLP-10-15V50 2 wire protector

Power: LPC # 20204 102/240V 3-wire single phase protector

C.3.3.2.3.4.3 Broadcast Signal

To avoid a single point of failure, two independent transmitter input interface units containing all circuits and components for remote operation and control of each transmitter of a dual transmitter system from a Government office shall be provided. Each transmitter of the dual configuration shall include a unit to serve as the interface between the audio input to the transmitter and the audio source when utilizing a type 3002 voice grade telephone circuit, UHF radio link, microwave audio link, or satellite link.

Transmitter Input Interface Functions. The transmitter input interface shall perform the following functions:

1. Receive, amplify and process audio signals for modulation of the transmitter.
2. Provide VOX keying to turn off the transmitter carrier within 10-60 seconds (adjustable) after loss of audio input, and turn on the transmitter carrier immediately after the resumption of the audio input.
3. Automatically modulate the carrier with a pulsed 425 Hz ± 10 percent tone adjustable to a level that will modulate the carrier 16 dB below maximum deviation when the transmitter is unable to provide output power at or above the preset threshold.
4. Switch between transmitters based on an NWR SAME encoded FSK message as a backup operation to the automatic switching identified in Section C.3.3.2.3.1. One event code will direct switching from primary to

secondary and another event code will direct the reverse. Switching shall be accomplished if the unit detects a match between a transmitted six digit FIPS address code and a six digit code programmed in the unit.

C.3.3.2.3.5 Remote Diagnostics

The transmitter shall be capable of remote diagnostics by providing status to a remote user and allowing for certain control functions. The interface for this function shall be a modem capable of operating, as a minimum, between 300 and 9600 bps. Available status indications shall include as a minimum:

- a. VSWR at the antenna connection
- b. VSWR at the power output stage
- c. Deviation
- d. Power Amplifier Total current
- e. Power Amplifier Output Power
- f. Power out of each module stage
- g. Switch-over fault condition
- h. Power Supply voltages
- I. Audio Input level
- j. Fault conditions on all major replaceable modules.
- k. Carrier Frequency
- l. Power Module Temperatures
- m. Cabinet Temperatures
- n. Active Transmitter
- o. Power Source Voltages (Both transmitters)

Control Functions shall include:

- a. Switch from primary to secondary transmitter
- b. Switch from secondary to primary transmitter

- c. Secure and unsecure the ability to switch transmitters via SAME encoded message on the audio input line.
- d. Execute a reset (default recovery mode to take both transmitters off-line) and a set (return to normal operations) to the dual transmitter system.
- e. Mute the transmitter exciter.

C.3.3.2.3.6 Monitoring

The contractor shall provide the following for monitoring operations:

- (a) Mounting location and interface to 1.75" high NWR ROAMS panel to provide failure notification to a remote location. The ROAMS panel shall be mounted such that the back of the unit is visible to a technician. The ROAMS panel shall be connected such that the ROAMS panel telecommunications line can be passed through to the analog connection of the remote diagnostic port on the transmitter.
- (b) Built-in visual fault indicators to provide a local indication of equipment malfunctions.

C.3.3.2.4 Transmitter Design.

C.3.3.2.4.1 Transmitter Configurations

The contractor shall provide transmitter configurations with maximum nominal output power of 100 Watts, 300 Watts, and 1000 Watts. These configurations are referred to by the nomenclature of G100, G300, and G1000 respectively in this document. Each configuration shall include two independent transmitters to satisfy the redundancy requirement. The 1000 Watt configuration shall be

provided in two different style enclosures, 1) a single rack (Model G1000-1), and 2) a two rack enclosure (Model G1000-2). Each rack shall have sufficient unused space available to the 1.75" high ROAMS panel. The NWR transmitters (at 1000 Watts) are intended to provide a nominal signal level of 8 microvolt per meter at a distance of 40 miles from the transmitter location (subject to environmental and geographical conditions).

The radio transmitter system shall operate, function, and comply with all requirements of this specification when operated under and subjected to all or any combination of the individual conditions listed in paragraph C.3.3.2.5.6.

C.3.3.2.4.2 Physical Requirements

At least four unused AC outlets of 110 VAC shall be made available within the rack of each transmitter tapped into the input to the transmitter power supply. The G1000 transmitter system shall be configured from electronic modules used in the G100 and G300 configurations. The commonality of parts (electronic modules, components, cables, connectors, etc.) between configurations shall be maximized in order to minimize logistic support costs.

The contractor shall implement a system utilizing equipment, interfacing circuits, and interconnections which will meet the performance requirements of this specification. The contractor shall furnish to the Government, equipment conforming to accepted commercial engineering standards and suitable for continuous duty operation (24 hours per day, 365 days per year) with minimal maintenance requirements. Reliability, maintainability, and stability of performance shall be prime considerations in the selection, purchase, and

design of components parts and sub-systems used in the transmitter systems. Human factors shall be fully considered in the design of operator controls and displays and in the accessibility of component parts and sub-systems.

The contractor shall provide suitable RF cables and cable wiring harnesses with appropriate, compatible connectors for interconnecting various components of the contractor's transmitter and for connection to NWS ROAMS panel and to the non-NWS utilities at each site. Cabling shall meet NEC and local codes and be suitably rated for their intended use at each site. All cable and connectors shall be uniquely identified, marked, and appropriately referenced in maintenance documents.

C.3.3.2.5.3 Electrical Interference

The system shall cause no electromagnetic (emitted or conducted) interference-related negative effects on nearby ADP, communications, or other electronic equipment. All equipment provided shall be certified by an independent FCC-certified test facility for compliance with Part 15 of FCC Docket 20780 for Class B computing devices. Should this testing demonstrate Class B compliance, the system shall be registered with the FCC. Compliance with the above FCC standard shall satisfy the requirement that the system meets this electromagnetic interference specification.

The transmitter system shall be designed and constructed in such a manner as to minimize susceptibility to externally generated radiated interference and minimize internally generated radiated interference in accordance with the NTIA "Manual of Regulations and Procedures for Radio Frequency Management," Chapter 5, section entitled "Technical Standards for Operations in the Band 162

to 174 MHz." Interfering signals (fundamental and harmonics from other sources at operating locations) shall be attenuated to the maximum practical degree consistent with equipment performance as specified in this specification. The design of each transmitter of the dual transmitter system shall be such that all harmonic and spurious emissions will be attenuated in accordance with the manual of "Regulations and Procedures for Radio Frequency Management," Chapter 5, section entitled "Technical Standards for Operations in the Band 162 to 174 MHz." The transmitters shall meet all appropriate requirements for FCC compliance in regard to commercial operation.

C.3.3.2.5.4 Safety

All potential hazards to people and equipment are to be minimized through the application of adequate measures and devices which will limit voltages and currents, during fault conditions, below the dielectric breakdown strength and time-current capabilities of the system and its components. The transmitter design shall minimize exposure to hazardous conditions during maintenance and repair procedures without requiring the transmitter to be taken off the air. Provisions for protecting the transmitter from damage due to induced or conducted power surges in both the power and signal delivery systems shall be provided as described in paragraph C.3.2.5.5(b) and shall comply with all radiation hazard reduction requirements of IEEE C95.1-1992.

C.3.3.2.5.5 Ancillary Equipment

The contractor shall provide all items necessary to ensure proper operation of all equipment provided.

An NWR transmitter system shall also include the following ancillary equipment:

- (a) Dummy Load sized for the transmitter system.
- (b) Lightning surge protection on the AC input and the program audio input lines.

Surge and lightning protectors shall be the same or equal to those currently in use by the NWS at existing transmitter sites as follows:

Signal: MCG # DLP-10-15V50 2 wire protector

Power: LPC # 20204 102/240V 3-wire single phase protector

C.3.3.2.5.6 Environmental Factors

Contractor provided equipment shall be designed to minimize impact on NWS facilities and shall conform to the following requirements:

- (a) Acoustic noise generated by any piece of indoor equipment provided as part of the transmitter system, when in a normal operating configuration, shall not exceed the limits shown in the table below when measured at the point of highest noise level at a distance of 5 feet from the exterior surface of the cabinet. Reference pressure for this noise limit is 0.0002 dynes per square centimeter.

<u>FREQUENCY</u> <u>BAND (Hz)</u>	<u>LIMIT</u> <u>(DB)</u>	<u>FREQUENCY</u> <u>BAND (Hz)</u>	<u>LIMIT</u> <u>(DB)</u>	<u>FREQUENCY</u> <u>BAND (Hz)</u>	<u>LIMIT</u> <u>(DB)</u>
20 - 75	79	300 - 600	52	2400 - 4800	43
75 - 150	68	600 - 1200	48	4800 - 9600	42
150 - 300	59	1200 - 2400	45	9600 - 20,000	45

- (b) Any indoor equipment provided as part of the system shall be able to operate in compliance with all requirements of this specification when exposed to any combination of the following:

Temperature: -30 degrees to +50 degrees (C).

Humidity: 10% to 95% R.H.

Combined Temperature and Humidity: 90 degrees F/55% R.H.

Altitude: Sea level to 7,000 feet (higher if required at user site)

Dust: Typical of light industrial areas.

Fungus: Typical of inland and coastal areas.

- (c) Any outdoor equipment provided as part of the system at Cooperator sites shall be capable of operating over a temperature range of -40 degrees (C) to +50 degrees (C), with a relative humidity of 0-100%, without performance degradation. Any furnished outdoor equipment shall also be capable of operating and providing the required availability under the following conditions. Specifically, this includes a requirement that the equipment be **operational** in winds of at least **90** mph, with rainfall in excess of **2.5 inches per hour**. This wind requirement shall be in effect for all sites showing a peak wind gust of 80 mph or greater. **Survivability** in winds of **125** mph shall be required for these same sites. In all other cases, survivability in winds up to at least **90** mph is required, and the equipment shall be fully operational at specified values in winds of at least **65** mph. Ice accretion of up to 1 inch shall not cause operational or structural damage to the system. It is **not** required that all outdoor equipment meet these worst case conditions, i.e., the design may be tailored to individual site requirements, as described above. Acceptance testing shall be structured to demonstrate compliance for each different type of equipment offered to meet these environmental requirements.

C.3.3.3 Core Services

As part of the core NWR transmitter requirement, the government may exercise any or all of the following options at its discretion.

C.3.3.3.1 Logistical Support System (Option 1)

The contractor shall provide logistical support for continued maintenance of the transmitter systems at both the site and depot levels (Section C.6.4). The contractor shall prepare an Integrated Logistics Support Plan (ILSP) in accordance with NWS WSOM Chapter A-31 and submit to the government for review and approval. Included shall be a proposed list of spare modules and components required. The proposed ILSP and Spares List must be approved prior to commencement of any installation work. Upon approval of the list, the contractor will provide and maintain the spares inventory to allow for timely maintenance of the transmitter systems. All modules and components shall be warranted to the same extent as the transmitter systems.

C.3.3.3.2 System Maintenance (Option 2)

The Contractor shall provide complete field maintenance services for installed transmitter systems to maintain the NWS system availability requirements. The NWR transmitter system operates 24 hours a day, 365 days per year. Maintenance shall be provided to insure that no individual site outage rate exceeds 88 hours per year. See Attachment J.x for additional information on maintenance requirements.

C.3.3.3.3 System Installation Services (Option 3)

(a) In the case where installation is to be done at a cooperator owned site the contractor shall not ship equipment to installation sites in advance of the contractor's installation personnel being on-site ready to install the equipment without prior coordination with the cooperator.

(b) All equipment shall be installed by the contractor in accordance with approved NWS installation procedures, following good engineering practices, and in compliance with any applicable national, state, or local codes, as well as any labor contracts in effect at the site that may affect the installation, in addition to all NWS requirements, as specified in Section C.4.

(c) All installation materials and labor shall be provided by the contractor, with the exception that the designated site representative may assist in connecting contractor-supplied cables between the contractor's equipment and Cooperator equipment and local facilities.

(d) After installation of the NWR equipment is completed by the contractor, proper operation and testing of the equipment shall be demonstrated to the Cooperator and Government designated site representative(s), as specified in Section E. Upon successful completion of installation, test and initial operation demonstration by the contractor, an installation completion form will be signed by the Government designated representative certifying that the equipment has been installed and tested, and that initial operation of the equipment has been demonstrated and found to be acceptable.

(e) Transmitters destined for transfer to the NWS will be accepted by the Government only after a two week period of on-line testing that clearly demonstrates performance as defined in this specification. Any failures during this testing period shall be corrected by the contractor, the correction reported to the Government, and the test re-started. Prior to Government acceptance the contractor shall assume all maintenance and logistic support responsibilities. If a successful test is not accomplished within 30 days, the contractor shall remove or replace the transmitter at the Government's option.

(f) The contractor shall provide and install, on an as needed basis, shelters for specific installations in those cases where space is not available for an installation at a specific site. The shelter shall be suitable for sustained operation of the transmitter and other ancillary equipment. In addition to providing space for the transmitter and ancillary equipment, shelter design must also take into account the requirements for ventilation, cooling, power distribution, audio line feed, antenna transmission cable interface, and grounding. The shelter must provide protection from weather, casual intrusion and any unique local conditions. Portable or prefabricated shelters may be used, however, the design of any shelter and its support systems must be submitted to and approved by the Government.

C.3.3.3.3.1 Inspections

The Government reserves the right to conduct selected spot checks at transmitter facilities in the field to ensure that installation specifications have been adhered to and that the quality of finished work is in accordance with NWS requirements.

C.3.3.4 Antenna and Transmission Line (Option 4)

The contractor will provide and install, on an as needed basis, suitable antenna and transmission line (including all mounting hardware) to complete a transmitter installation. Materials used must comply with NWS requirements for the NWR transmitter network system. To provide for system standardization and network wide compatibility, components proposed must be equivalent to the following. Antennas shall be CELWAVE PD1500-4/PD1500-8, SWR WRX/8 or equivalent. Transmission cable shall be CABLEWAVE or TIMES MICROWAVE RG-333 or equivalent. Proposed equivalent or substitute antennas or transmission cable must be submitted to the Government for approval prior to installation.